

# EUROPEAN PATENT OFFICE

## Patent Abstracts of Japan

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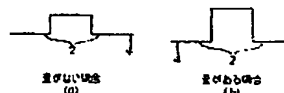
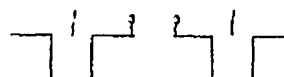
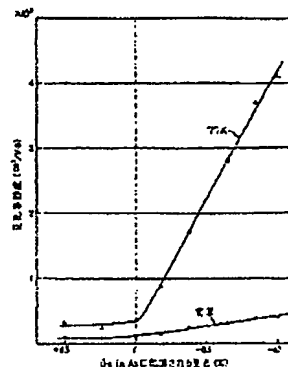
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TITLE : SEMICONDUCTOR DEVICE



ABSTRACT : PURPOSE: To increase hole mobility by a method wherein a valence band discontinuous quantity in a single-quantum well structure is rendered to be larger than in a well free of strain for a reduction in the hole effective mass.

CONSTITUTION: This design aims to increase the mobility of a hole in a semiconductor by a method wherein a valence band discontinuous quantity corresponding to a heavy hole between semiconductors constituting a single-quantum well structure is supplied with strain in said well structure. For example, on a high-resistance InP (100), a single-quantum well structure is grown, composed of  $\text{Ga}_x\text{In}_{1-x}\text{As}$  and  $\text{Al}_y\text{In}_{1-y}\text{As}$ . Then, the strain supplied to the  $\text{Ga}_x\text{In}_{1-x}\text{As}$  is caused to change. The mobility of a hole, when the quantity of supplied strain  $\epsilon$  is negative (compression strain), rapidly increases as the absolute value of the strain increases. The increase is attributable to an increase in a valence band discontinuous quantity corresponding to a heavy hole in a  $\text{Ga}_x\text{In}_{1-x}\text{As}/\text{Al}_y\text{In}_{1-y}\text{As}$  interface exposed to strain. That is, there will be an approximately 140meV increase in the valence band discontinuous quantity in a  $\text{Ga}_x\text{In}_{1-x}\text{As}$  or  $\text{Al}_y\text{In}_{1-y}\text{As}$  system with a compression strain of +1% supplied thereto.

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